Orientation 2019

Introduction

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Introduction

What we do

- Support department research

- Build servers and clusters

- Manage infrastructure

- Helpdesk support

How to get in touch

Contact us via

cshelpdesk@virginia.edu

Find more information

https://cs.virginia.edu/wiki

Introduction

What we don't do

- Email accounts
- Mailing lists
- Netbadge

Who Does?

ITS

4help@virginia.edu

Find more information

https://its.virginia.edu/helpdesk

Introduction

What else we don't do

- Phones
- Department mailing lists
- Environment requests (AC, heating, etc.)
- Facilities requests
- Room (swipe) access

Who Does?

CS Office Staff

cs-office@virginia.edu

Introduction

Help Desk Tickets

- Email sent to `cshelpdesk@virginia.edu` will generate support ticket
- Should receive auto-response and ticket number in the subject line
- Tickets help us track support requests
- Reply to original email thread
- Don't modify subject line

Accounts

Accounts

CS Account

- **Different from ITS/NetBadge account**
- Allows login to department resources
- User accounts come with file storage
- Web hosting space associated with account

Accounts

CS Account

You will receive an email with subject:

UVA Computer Science Account Info

From **cshelpdesk@virginia.edu** containing your account information

Password is temporary, you will be asked change it at first login

Accounts

CS Domain

- One password for everything CS
  - No longer separate passwords for Windows vs. Linux
- Account and file storage will expire when you leave
- Files owned by expired accounts will **not be kept**

Accounts

Password Change

Users can change their password during active session (Linux/Windows)

Password Reset

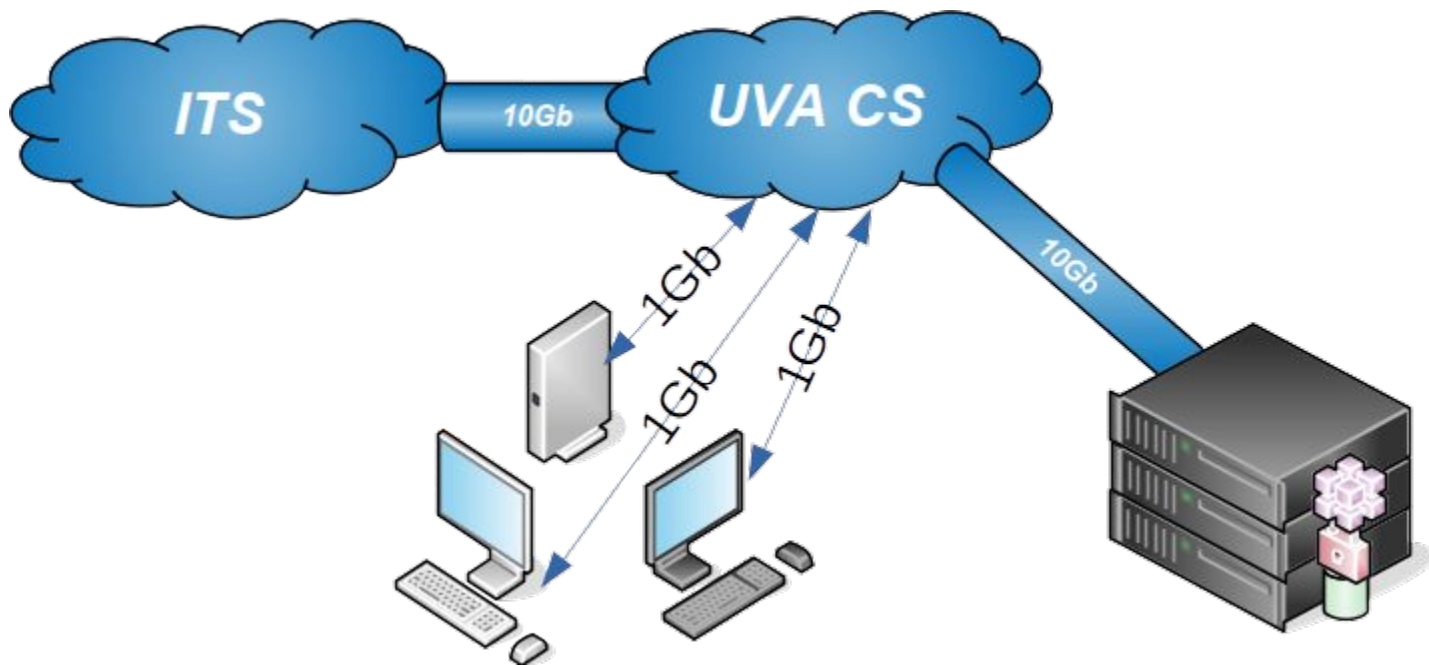*New* Users are able to reset their CS password online

https://www.cs.virginia.edu/PasswordReset

Network

—

Network

Network

- CS has its own network apart from ITS
- Layer 2 network
- 1Gb/s connection at each desk
- Growing 10Gb/s network
- Public IP addresses
  - CS has 6 class C subnets

Network

- Network clients must be registered
- Clients can be registered by request
- CS has no wireless network
    - Wireless clients should connect to ITS WiFi
- Unauthorized clients will be found and blocked **without notice**

Network

DHCP

- Clients must register device MAC Address
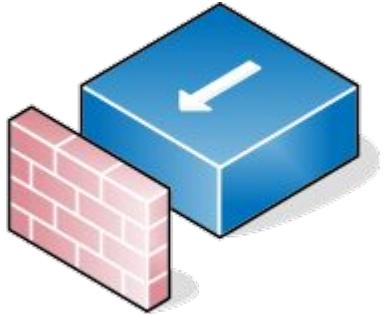- Requests for new devices must come from faculty

Network

DNS

- Authority for cs.virginia.edu domain space
- Hosts are in cs zone
  - A computer/server named power2 has FQDN power2.cs.virginia.edu
- Names and aliases may be requested by faculty

Network

- ITS blocks certain types of traffic
  - Samba
  - Windows Remote Desktop
- ITS watches network traffic looking for
  - Botnets
  - Malware activity
  - Torrents
  - Spam
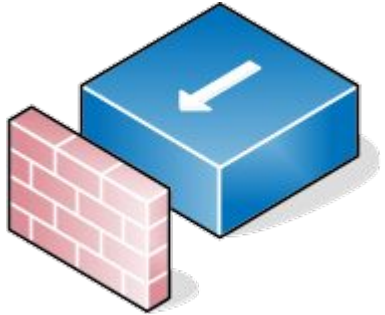- Flagged traffic can result in Abuse Ticket
- *New firewall in CS*

Network

Absolutely no wireless access points!

Network

SSH access now blocked from outside of UVA

If you are outside of the university, you can:

- Use VPN client - access servers directly using VPN
- SSH to `portal.cs.virginia.edu`

Port 22 is open on portal.cs.virginia.edu

Network

SSH Jumphost Option

```
[ktm5j@outside-uva ~]$ ssh -l ${userid} ${destination} -J portal.cs.virginia.edu

[ktm5j@outside-uva ~]$ ssh -l ktm5j power3 -J portal.cs.virginia.edu
ktm5j@portal04.cs.virginia.edu's password:
ktm5j@power3's password:
ktm5j@power3 ~ $                          <-    Logged into power3
```
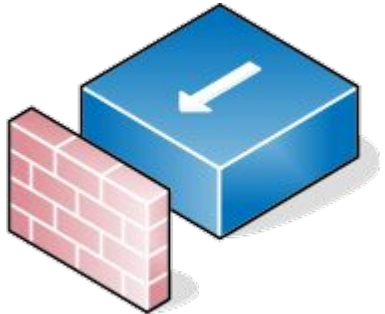
Operating Systems

Operating Systems

- All major operating systems found in CS
- Official support for
  - CentOS 7.6
  - Ubuntu 18.04
  - Windows 7, 10
  - Mac OS X
- Desktop systems come dual-boot Windows/Linux

Linux

- Main research platform
- CentOS on server systems
- Ubuntu on desktop systems

Linux

Software

- Common software available as *Modules*
- Smaller packages (libraries, dependencies, etc) installed through OS packages

Linux

Modules

- Modules allow multiple versions of same software to co-exist without affecting each other
- Software is located in /sw
- Mounted over NFS & available everywhere

Linux - Modules

View software with `module avail`

Load a module with `module load`

Windows

- Desktop systems come with Windows 7 or Windows 10
- Systems joined to CSDOM domain
- Users can be added to local admin group **once they return signed policy agreement**
- Windows 10 systems use Windows Defender

Mac OS

- Mac systems are ad-hoc
- Not joined to domain
- Not set up for NFS
- Can use samba to mount home directory
- Use samba to print

File Storage
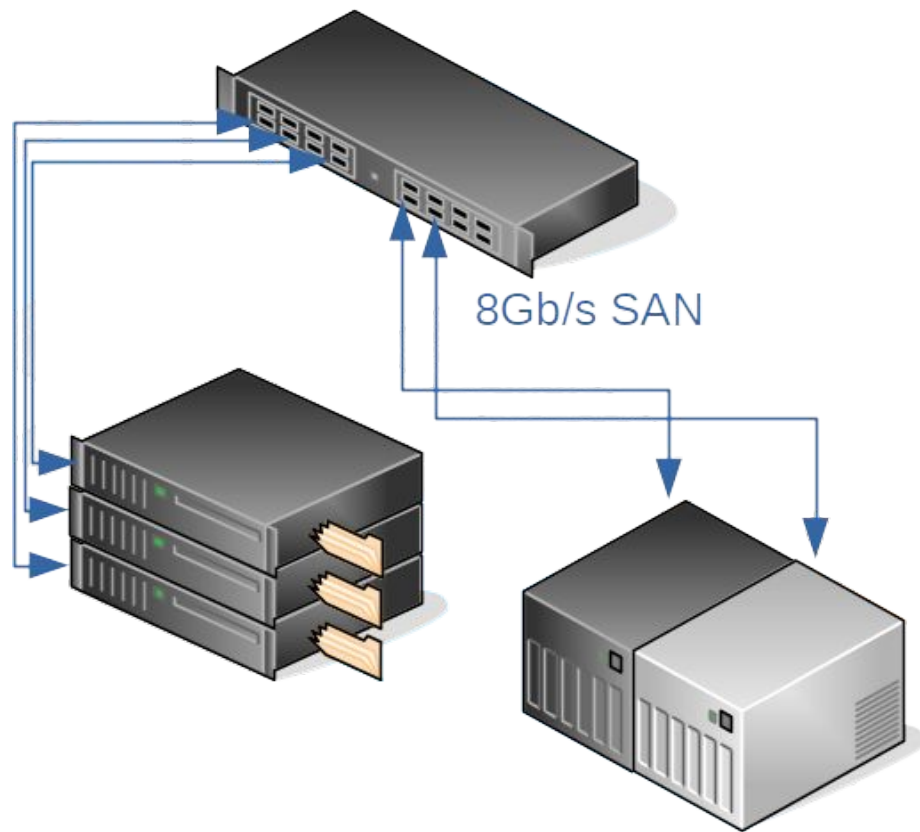
8Gb/s SAN

File Servers - SAN Configuration

File Storage

- 8Gb/s SAN network
- ~1PB of disk space in CS
- All partitions now ZFS
- Snapshots every 6 h
- Off-site backups
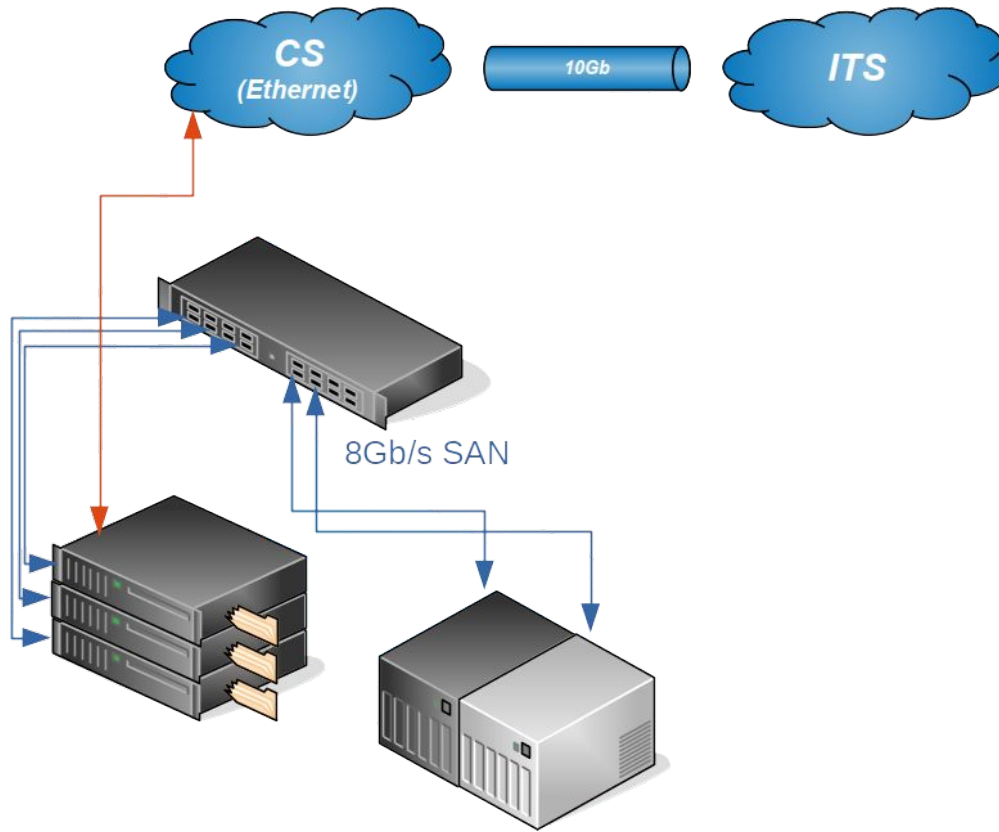
File Servers - Ethernet connected to off-site backup location
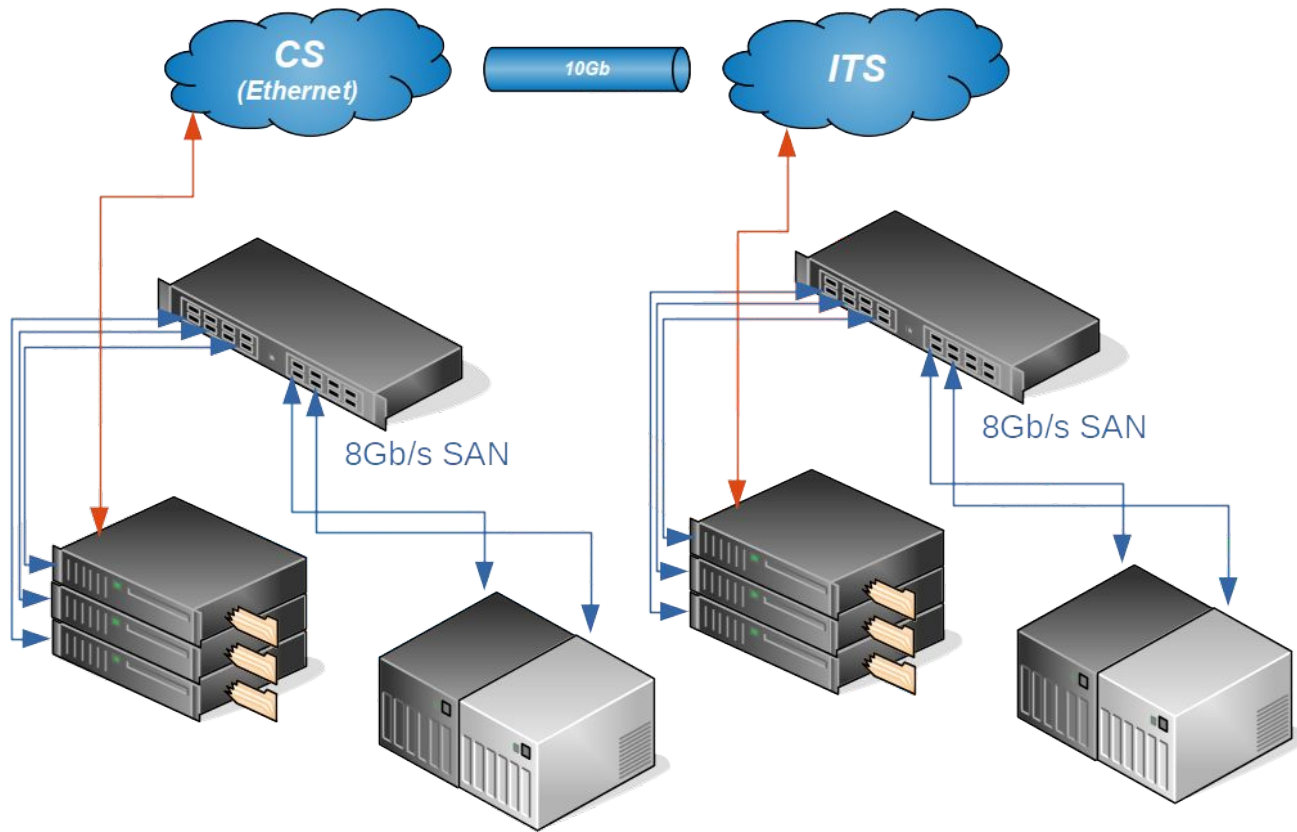
File Servers - Storage configuration mirrored at backup site

File Storage

ZFS

- Dynamic partitions
  - Storage can be hot-added or removed
  - Partitions can be moved easily
- Snapshots
  - Exact copy of partition
  - Window into past
  - Easy to interact with

File Storage

Home Directories

- Network storage mounted on all Linux systems
  - Home directory available everywhere
  - Mounted in /
- Historically home directories organized by partition
- Partitions are associated with faculty member
- Old partitions named `zf1-zf25`
- Very old partitions named `af*` or `uf*`

File Storage

Network Access

- Department computers pre-configured
- Linux systems have all partitions mounted via NFS
- Windows desktop systems mount home directory to **K:** drive
- NFS restricted to UVA networks & authorized clients

Personal Devices & Outside CS

- Samba/CIFS can be used
- Must be inside UVA network or on VPN

File Storage

Samba/CIFS

We have a new central samba server:

\\samba.cs.virginia.edu\username

- One address for everyone
- Authenticate with CS credentials

File Storage

New Storage - /u and /p

- Additional 300TB added to SAN
- New /u and /p partitions
    - /u - user home directories
    - /p - project directories

File Storage

/u - Home Directories

- New accounts
- Each home directory as its own ZFS dataset
- 20GB quota

/p - Project Directories

- Project space
- Better place for data
- Group owned
- Can be tweaked for performance

File Storage

/bigtemp

- Large 70TB volume
- Used for storing large datasets
- Scratch space
- **Not backed up**
- Files may be deleted after period of time

File Storage

Backups and Snapshots

- Snapshots taken every 12 hours (2x per day)
- Snapshots immediately transferred to off-site
- Typically kept for 30 days

Snapshot Quirks

- Because of snapshots, deleting files does not recover space
- Space only recovered once snapshot eventually deleted
- Full ZFS datasets will require admin intervention

Web Server

Web Server

- Every account gets web space under www.cs.virginia.edu domain
- Server runs PHP
  - With DB connectors
- DB accounts are requestable

Web Server

Content for each user-site is found in home directory

`~/public_html/`

URL format

`https://www.cs.virginia.edu/~username`

Web Server

Content for each user-site is found in their home directory

~/public_html/

Example - Mozilla Firefox (Private B

Example ×   +

ⓘ www.cs.virginia.edu/~ktm5j/example/

Hello World

Terminal

File   Edit   View   Search   Terminal   Help

```
ktm5j@applecake ~ $ pwd
/u/ktm5j
ktm5j@applecake ~ $ cd public_html/
ktm5j@applecake ~/public_html $ cat index.html
<html>
  <head>
    <title>Example</title>
  </head>
  <body>
    <h1>Hello World</h1>
  </head>
</html>
ktm5j@applecake ~/public_html $
```
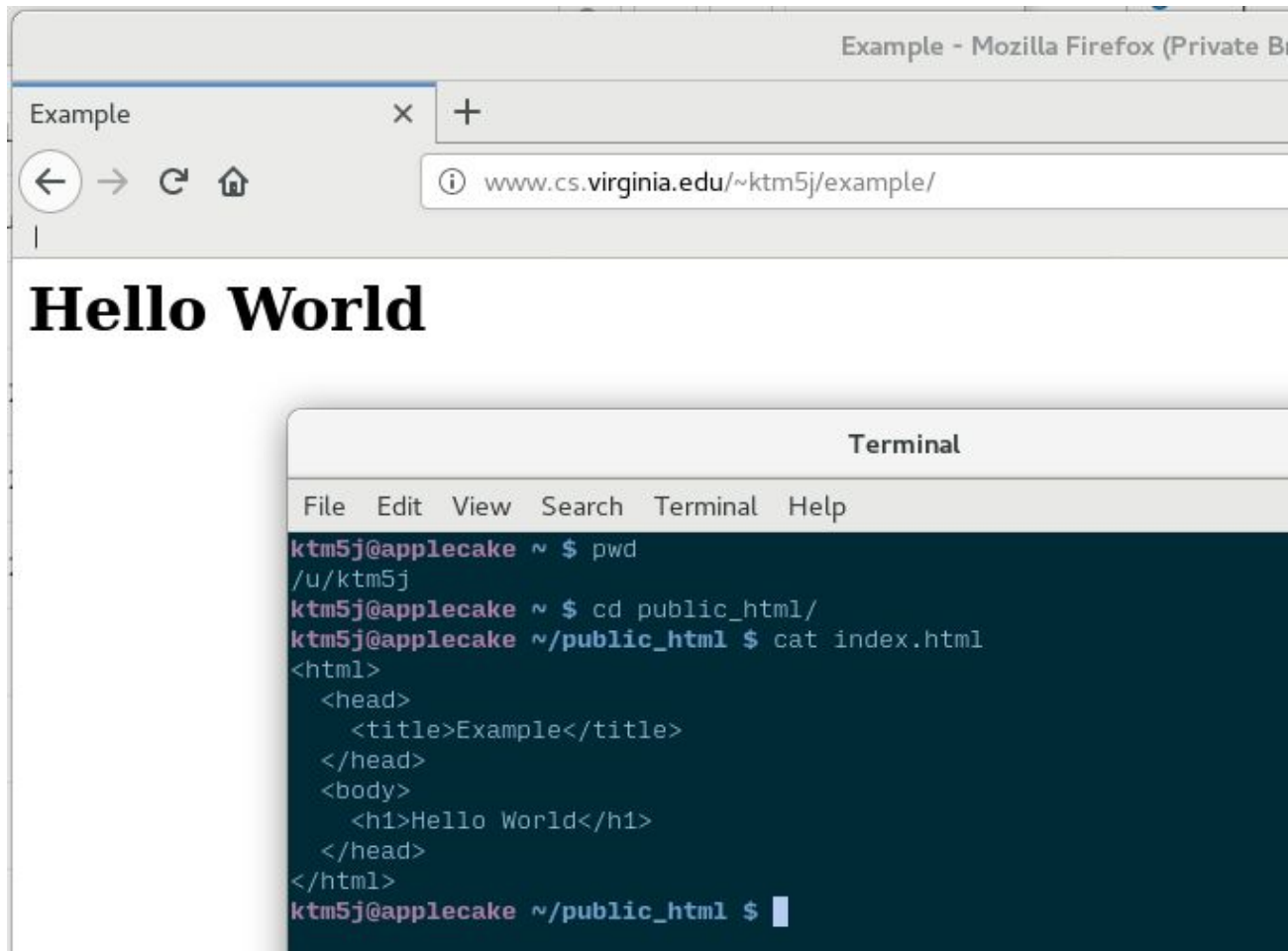
Department Resources

Department Resources

Printing

- Printing available at no cost
- Two print servers
    - Windows print server
    - CUPS Unix print server
- Poster printing available

Department Resources

Poster Printing

- Poster printing available upon request
- Request for poster printing must be sent to **cshelpdesk@virginia.edu**
- Poster requests must be submitted with **48 hours notice**

Department Resources

Loaner Laptops

Lenovo loaner laptops are available for students

- Request must be made by faculty
- Short term, typically 2 weeks or less
- Period can be extended with approval

Department Resources

CS Office

The following requests are handled by admin staff and should be sent to **cs-office@virginia.edu**

- CS department mailing lists (cs-faculty, cs-grads etc.)
- Room (swipe) access
- Conference room scheduling

Computing Resources

Computing Resources

- Many clusters in CS
- SLURM used for *scheduler*
- GPUs
- FPGAs
- Infiniband

Computing Resources

SLURM (Simple Linux Utility for Resource Management)

- Workload manager for 60% of TOP500 clusters
- Allocates resources to clients
- Jobs can be submitted from power nodes (power[1-6])

```
ktm5j@power3 ~ $ srun -w slurm[1-5] hostname
slurm3.cs.virginia.edu
slurm1.cs.virginia.edu
slurm5.cs.virginia.edu
slurm2.cs.virginia.edu
slurm4.cs.virginia.edu
ktm5j@power3 ~ $
```

SLURM Nodes

Hostname	Count	GPUs	Memory (GB)	CPU Type	CPUs	Sockets	Cores/Socket	Threads/Core
hermes[1-4]	4		256	AMD	64	4	8	2
artemis[1-7]	7	1	128	AMD	32	2	8	2
slurm[1-5]	5		512	Intel	24	1	12	2
falcon[1-10]	10		128	Intel	24	1	12	2
nibbler[1-4]	4		64	Intel	20	1	10	2
trillian[1-3]	3		256	AMD	64	4	8	2
granger[1-6]	6		64	Intel	40	2	10	2
granger[7-8]	2		64	Intel	16	2	4	2
ai0[1-6]	6	4	64	Intel	32	2	8	2
lynx[01-12]	12	4	64	Intel	32	4	8	2
affogato[01-15]	15		128	Intel	16	1	8	2

gpusrv Nodes

Hostname	GPUs	Memory (GB)	CPU Type	CPUs	Sockets	Cores/ Socket	Threads/ Core
gpusrv01	2	32	Intel	12	1	6	2
gpusrv02	2	64	Intel	12	1	6	2
gpusrv03	2	64	Intel	12	1	6	2
gpusrv04	2	64	Intel	12	1	6	2
gpusrv05	2	64	Intel	8	1	4	2
gpusrv06	2	64	Intel	8	1	4	2

Computing Resources

SLURM Nodes

- >2000 cores in SLURM
- Almost 10TB Memory
- 50 GPUs

Power Nodes

- power[1-6]
- 96 cores
- 576 GB Memory

Gpusrv Nodes

- 64 cores
- 352 GB Memory
- 12 GPUs

Takeaways

Takeaways

- CS vs. ITS
- Lots of computing power
- Lots of storage
- Be mindful
- cshelpdesk@virginia.edu